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改變積儲對抽穗後稻株內非結構性碳水化合物動態分配的影響

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中文摘要

由過去的試驗得知水稻抽穗後若積儲不足，碳素及氮素同化物質會轉而蓄積於葉片及莖稈中，但對於葉片的光合能力並無顯著影響，因此認為改變水道積儲，主要的影響在於同化物質在各器官之間的分配型式。本研究的目的則在探討喪失穗部積儲後，非結構性碳水化合物(TNC)於不同節位各器官間的分配動態。試驗結果顯示，不論雄不稔或剪穎所引起的穗部積儲不足，葉片所含的 TNC 濃度增加不多，葉鞘所含 TNC 雖較多亦仍有限，而莖部之 TNC 濃度的增加則很大，尤其在第 3 及第 4 節位可高達 58%，其餘節位濃度亦很高。剪穎處理植株的 TNC 之動態分配型式與雄不稔植株十分類似。因此認為不論雄不稔或剪穎方式的降低穗部積儲，莖部均為碳素同化物質的去袋積儲器官，葉鞘次之，同時利用剪穎處理來探討積儲改變同化物質生產的研究雖有限制，但對同化物質分配的研究，則不失其適切性。

關鍵字：水稻; 雄不稔近同源基因系; 供源-積儲; 非結構性碳水化合物

Abstract

Results from previous experiments indicated that in rice, reduction of sink demand resulted in no remarkable change in photosynthesis or total dry matter production, however, significant accumulation of carbohydrates and N in the vegetative organs was observed. It therefore suggested that post-heading sink manipulation could lead to a drastic shift in the pattern of assimilation distribution rather than a decrease in assimilate production. The purpose of this study was to investigate the partitioning dynamics of total nonstructural carbohydrates (TNC) among leaf blade, leaf sheath, and stem at different node positions of rice plants subjected to sink manipulation by spikelet removal or male sterility. Experimental results revealed that, as compared to fertile plants, sink manipulation increased TNC concentrations in the leaf blade, leaf sheath, and stems during the grain-filling period. The increase of TNC concentration in the stem internode was especially significant. Concentrations as high as 55-58% were recorded in the 3rd and 4th internodes (counted basipetally) between the 3rd to 5th weeks after heading. There was no significant difference between the treatments of spikelet-clipping and male sterility. It was suggested than stem was the most important alternative sink of carbohydrates when the sink demand of panicles was reduced in rice. Although spikelet-clipping can affect the physiology of the rice plants in many aspects, it is still an useful tool in studying the effect of sink removal on the distribution of assimilates.

Key words：Rice; Oryza sativa L.; Male sterile; Source-sink; Total nonstructural carbohydrates